Telephony

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MOBILE COMMUNICATIONS S HOT IN EUROPE But who ill supply the phones and what ystem will come out on top?

MFJ BILL FORGES AHEAD IN SENATE
Historic milestone reached as committee passes legislation

BUSINESS USERS LASH OUT AT TELCOS
ICA criticizes BOCs for failing to meet users' needs

MONDAY, MAY 28, 1990 Volume 218, No. 22

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

The standards cross-country trek for mobile communications in Europe is heating up. Even if PCN wins the U.K. time trial, will it be the overall winner on the continent? Cover art by Michael Jones

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China follows the long road to telecom growth

After decades of neglect, the Chinese are aggressively upgrading their telephone network

LIN SUN

Between the 1950s and early 1980s, China gave its development priority to heavy industry and agriculture. For a long time, a telephone was considered a luxurious commodity and given little attention. Postal and telecommunications systems were largely outdated and inefficient, and their profit level was incredibly low.

In the early 1980s, however, China began to view telecommunications as an integral part of its strategic development. According to the Ministry of Posts and Telecommunications (MPT), by the end of 1980, China had only 4.2 million telephone sets for a population of about 900 million. That works out to only 0.4 phones for every 100 people nationwide, or 0.4%. This was far below the world average of 11% for the same period.

By 1987, China's phone penetration level had grown to 0.75%. However, this was still far below the world average, and even below other developing countries. During the same time, for example, the telephone density in South Korea was 9.1%, Mexico was 7.6% and Brazil was 6.3%.

Beijing, China's capital city with a population of 10 million, enjoys the highest telephone density in the country, mainly because it is the center of colossal government agencies and a handful of economic activities. But its telephone density is only 4.7%, one of the lowest telephone densities among the world's capital cities.

Now after eight years of development, the telephone industry in China finally is beginning to take shape. Telephone penetration is growing at the phenomenal pace of 20% annually. The race for advanced switching and transmission technology is accelerating.

To maintain a high speed of development, however, China must address key issues. These include production of push-button telephone sets, digital switching equipment and advanced transmission media.

China has obtained technology to manufacture telephones with standard features. Although the production figure is not known, Chinese-made push-button phones have appeared in the market, with advanced features such as built-in memory, automatic redial, call waiting and third-party conversation. At present, production capacity lags behind market demand. A policy should be made in the direction of replacing rotary dial with push-button phones in accordance with digital switch implementation.

The current annual switch production output is about 200,000 lines, about 3000 of which are long-distance switches and about one-third of which are manual switches. The manufacturing capability is being dwarfed by demand for new lines and high call volumes. China didn't use stored program control (SPC) switching until 1984, but the SPC capacity increased to 25% of total switching lines by 1988, thanks to technology transfer and large-scale imports. For the next few years, China will have to continue importing advanced PBXs from overseas to transform and update its telecommunications networks.

Copper cable is currently the primary transmission medium for China's more than 300,000 kilometers of long-distance networks, with microwave systems accounting for less than 4%. However, the low capacity of copper lines and poor transmission quality are directly responsible for overloaded traffic and low call completion rates (approximately 20% to 30% in cities). High-capacity media such as coaxial cable and fiber optics are critical for digital technology development and data transmission.

Administrative Structure

In general, China's telecommunications structure reflects pyramidic political and economic structures. China's telecom administration consists of four levels.

The MPT sits on top of the entire hierarchy and is solely responsible for all international and domestic long-distance communications, such as tariff policy, services, technology transfer and research and development. The MPT also assumes administrative power over all telecom manufacturers, carriers and other postal services.

In reality, this responsibility does not come with strong financial ties or market considerations at the local level. A local telecom authority controls its budgeting and production plans in its own territory, although it has to conform with MPT policies and seek MPT approval before it acts.

This dual administrative structure can hurt local development. For example, little R&D is done on the local level, although centralized research may not be applicable locally. Moreover, because of the centralized decision-making process, reaching a workable decision is a time-consuming process. That means that local phone companies cannot be as responsive to local market needs.

Financing

In the past, China's telecommunications revenues did not come from products or services provided to the market, but were totally dependent on government subsidies. Budget deficits have seriously constrained development. The annual budget for telecommunications had been only about 0.8% to 1% of the total, compared

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to 5% in most countries. A return on telecommunications investments was not even expected, making it one of the slowest industries to develop.

Since the 1980s, the situation has changed dramatically. Relaxed financing policies in the economic arena forced the telecom industry to resolve its funding shortages. Another factor in this change is the huge amounts of capital required for technology transfer and other R&D projects.

Questions also have arisen concerning the use of funds. A contradiction exists between centralized planning and local financing incentives. A local telecom authority may have the money to buy equipment, but must have the purchase approved by the MPT. This discrepancy may cause gradual deviation from central management, which may delay progress. Or it may prompt the government to continue to yield more decision-making power to the local level.

TABLE 1 TELECOMMUNICATIONS FINANCING SOURCES (1986-1990)

Sources	Proportion (%)
Central government	31.05*
Local government	4.52
Domestic loans	3.69
Foreign capital	0.29
Self-raised investment:	
By localities	3.01
By enterprises	51.13
Other sources	4.31

Source: *Development of Telecommunications in China*, MPT, 8/88

* China usually combines the budget for telecommunications industry with transportation. The 1987 budget was about $3 billion. The telecommunications budget was unlikely to exceed half of the total, so the estimated telecom budget is around $1.5 billion.

Government subsidies can no longer maintain a steady development pace.

A policy for multiple financing was formalized in 1986 (Table 1). Although government financing still accounts for a large portion (more than one-third) of the budget, the portion is expected to decrease in the 1990s as local financing grows. Though the advantages of a mobilized financing policy may not be realized in the near term, the direction is toward a marketplace of telecom products and services that for the most part do not exist today.

In general, a higher investment suggests a better return. But in China, a good financing policy has to encompass, or often compromise with, factors such as bureaucracy, management and training. Investment return is another hidden impairment. At present, the turnover from telecom services accounts for only 0.15% of the gross national product (GNP) compared to 2% to 3% in other countries.

Although it is unlikely that the current financing options will change the administrative structure completely, the trend will be toward a gradual mobilization within a centralized system.

In any event, telecom financing is a crucial bottleneck for development. Although the lack of funding is always imminent, a good distribution of funds will result in a better return on investment. From this standpoint, centralized expenditures are the least preferred policy option because they often overlook specific needs and waste is almost unavoidable.

Prospects of Foreign Investment

Despite little direct investment from the international community, China has been purchasing state-of-the-art telecom equipment in large volumes from foreign vendors.

In the first half of 1988, China signed contracts with overseas suppliers to import 2.7 million SPC intracity telephone sets and 95,000 SPC long-distance sets during the next decade, according to a report in China Market. Thus far, more than 1.54 million intracity phones and 40,000 long-distance phones have been installed.

Japan has been China's leading equipment supplier and trade partner with 35% of total sales. In the past two years, China has steadily increased its orders from European vendors from about 10% to 20%. North American vendors seem to have made little progress in increasing sales to the Chinese market, remaining at 20%. Surprisingly enough, U.S. vendors have played a moderate role. Although AT&T has sold some 5ESS ISDN-ready switches, it has a cautious marketing policy in China. In contrast, Northern Telecom of Canada has been active in China.

Japan is vying rigorously for the Chinese market with its European rivals. During a visit to China last August, Japanese political leaders promised an Y810 billion ($5.29 billion) government loan package. China will use part of the loan to buy 620,000-line SPC PBXs for its nine provinces. So far, Sweden's LM Ericsson, Alcatel of France and other vendors have successfully sold at least $100 million in telecom equipment products to China.

The large-scale technology transfer soon may show serious problems, such as protocol compatibility between different systems. With that problem still somewhat distant, however, China is most concerned about how to harness technology transfer to its strategic goals.

The first step is to establish a national communications infrastructure. A four-tier network is being proposed with the following nodes: interprovincial, provincial, intercity and county. Each tier has several subnodes, or centers. Metropolitan areas are most likely to be the centers of the proposed network.

The second step is for China to emphasize its acquisition of research and manufacturing capabilities to eventually take the lead in its market and exportation. To serve this purpose, foreign vendors often are asked to engage in

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joint-venture marriages. For example, Ericsson has a joint venture in Beijing to manufacture a 300,000-line ISDN AXE SPC exchange in China. Northern Telecom's joint venture is investing $13 million to produce integrated services digital network systems and digital phone sets.

Joint ventures are seen as a convenient approach for China to acquire advanced technology and satisfy its domestic market at the same time. They also may present a potential market for foreign vendors. Joint ventures also have posed serious problems. These include conflicting management styles, product quality and, above all, China's eagerness to acquire new technology and foreign vendors' hesitation about investment return and effectiveness of current policy.

Other Major Developments

China's telecommunications industry has made other strides to reinforce its telephone networks by building a solid infrastructure. New economic policies and regulatory measures soon may be put forth in the Chinese legislature.

China also has installed more than 25 short to medium-sized (500 kilometers or shorter) fiber optic transmission links across major cities. They are used primarily for intercity telephone communications, television transmission and data networks. The first long-distance fiber trunk (2200 kilometers) is under construction in central China and will be completed this year. Optical fiber, terminal control equipment and other key systems are being imported from the United States, Italy and West Germany.

The trunk will provide six data communications channels, each with a capacity of 1920 lines. Along with other local trunks, the fiber network will greatly improve communications quality and eventually reduce long-distance rates.

China is already using a cellular system in Beijing, and a number of others are under way. The Motorola TACS system in use in Beijing operates at 900 MHz and was chosen for its 360 channels in A-band, with B-band for future expansion. It covers the central Beijing area with hotels, business districts, airport and tourist attractions. The project cost about $10 million. Cellular phone users are expected to reach 30,000 by 1990, primarily concentrated in coastal cities and industrial centers.

China began importing fax machines in the early 1980s. According to MPT statistics, fax users exceeded 10,000 in 1988. In Beijing, international fax transmissions account for 13% of total remote communications. Public fax services and networks are also available from post offices in major cities. Annual market growth is estimated to be 4% for the next few years. Limited phone lines will greatly constrain the fax market. Fax users will amount to 25,000 by 1990.

China has an aggressive five-year plan for telecommunications growth. Though obstacles remain, there is much hope that a turnaround is in sight. T

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European mobile communications is hot, hot, hot

JOHN WILLIAMSON, International Editor

Mobile communications is hot in Europe right now, causing heated debates and intense rivalries among the wanna-bes. Who wouldn't want to get in on the action when many observers predict that by the end of this decade 50% of all telephones bought in Europe will be mobile? What is still up for grabs is who will supply these phones and what type will be most successful in the marketplace.

Although analog cellular telephony and private mobile radio will continue to satisfy European users' communications needs, the big mobile explosion is expected to come from four new technologies—telepoint, digital European cordless telephone (DECT), the digital cellular system know as Groupe Speciale Mobile (GSM) and personal communication networks (PCNs). All of these systems will compete with each other, although initially the duels will be telepoint vs. DECT and GSM vs. PCN.

Telepoint's Changing Fortunes

Telepoint is a limited distance, one-way cordless pay phone service based on the CT2 cordless telephone standard. Users must be within approximately 100 meters of a public access point, and handover from one coverage zone to another is impossible. It recently debuted in the United Kingdom, but already has had a somewhat checkered career.

In 1989, four consortia—BYPS Communications, Ferranti Creditphone, Phonepoint and Mercury Callpoint—won licenses to provide proprietary telepoint services, but all are required to move to a common air interface (CAI) system later this year.

The proprietary systems have not been runaway successes,

The cross-border use of GSM was originally touted as one of its unique selling points. Today, the consensus is that this will be of less consequence than the additional capacity it will provide.

and one senior industry executive admits to having "fumbled the ball."

And it gets worse. At the end of 1989 the U.K.'s Department of Trade and Industry (DoTI) licensed three consortia—Mercury Personal Communications, Unitel and Microtel—to provide two-way PCN services beginning in 1992. Mercury now includes Motorola and Telefonica; Unitel is made up of STC, Thorn EMI, U S West and Deutsche Bundespost Telekom; and Microtel presently comprises British Aerospace, Matra, Millicom and Pacific Telesis.

Although the DoTI tried to downplay any adverse effect PCN might have on telepoint, earlier estimates of up to 6 million CT2 telepoint users by 1995 look unrealistic.

Attempts to sell telepoint abroad—to achieve economies of scale—were originally rebuffed by the European Commission. The EC, along with a group of manufacturers led by Ericsson and Phillips, was concentrating on DECT standardization. Although DECT is designed for cordless PBX applications, public network derivatives are being developed.

DECT, like PCN, is two-way. In September 1989, a group of European manufacturers signed a memorandum of understanding committing to develop products that would enable DECT implementation next year.

Three months before the DECT memorandum, the European Telecommunications Standards Institute (ETSI) held a special forum to review and prioritize the region's proliferating mobile research and service initiatives. In its March report, the review's executive summary did not mention telepoint, which led to speculation that CT2 had suffered a death blow.

The full ETSI report did in fact support trials of both CT2 and DECT to gauge market reaction in different countries. Manufacturers such as GPT argue that another recommendation of the review—

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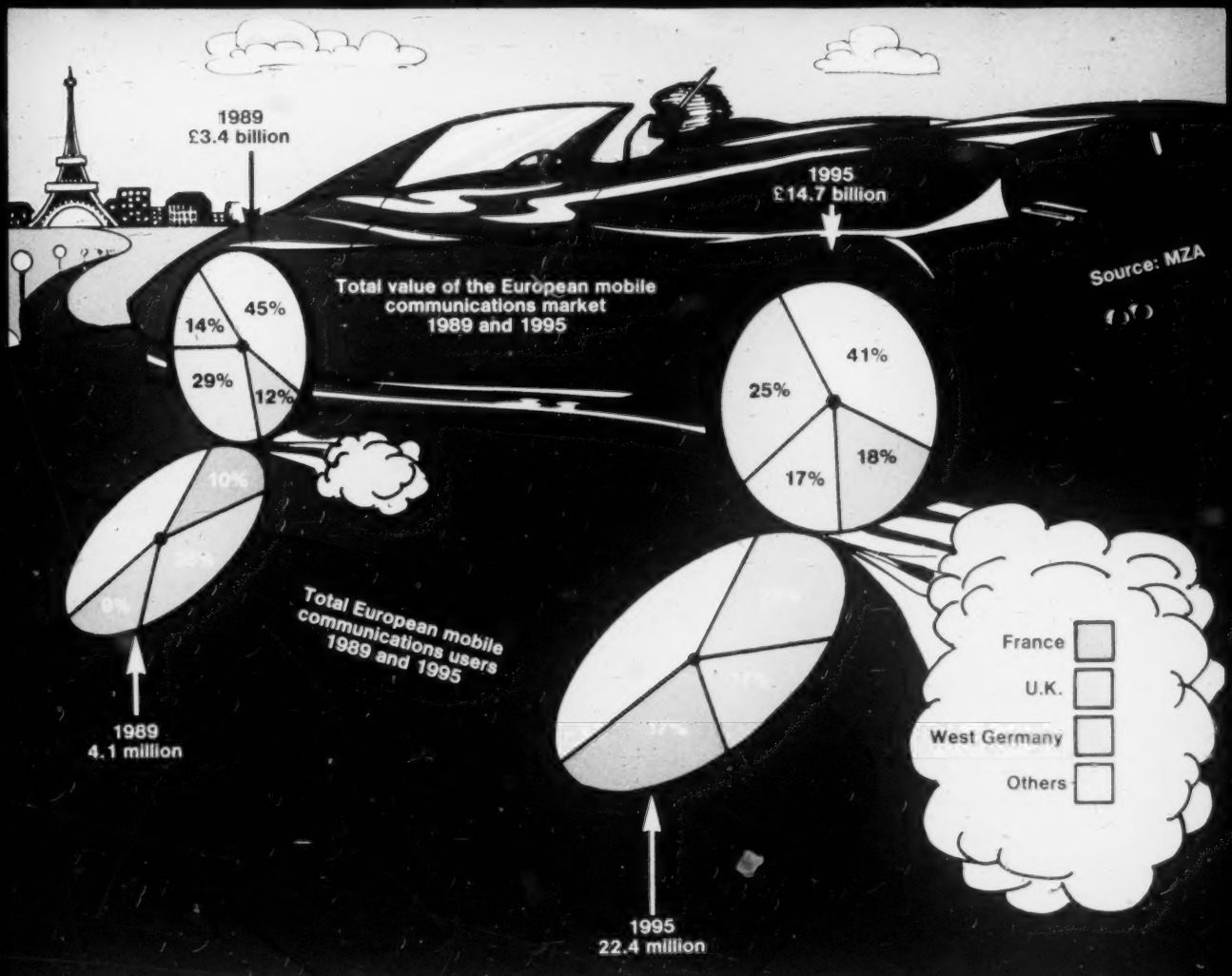

Hot, Hot, Hot *continued*

to base PCN on the GSM standard—would neither extend nor narrow the commercial window for CT2 since initial PCN terminal prices would be high out of necessity, and mass markets are price sensitive.

"Nobody has come up with any wonder technology," says Tim Lowry, director of GPT Mobile Systems. "PCN is not going to be cheaper than GSM in the first five or six years."

The U.K. CT2 camp feels that the technology will turn a profit, although everyone agrees that DECT is the regional cordless device of the future.

"We see a good international market for at least five years before DECT and PCN technologies become as competitive as CT2," says Richard Mendelsohn, marketing director of Orbitel Mobile Communications Ltd.

A new report commissioned by BYPS Communications from the U.K.'s Henley Centre for Forecasting predicts that the telepoint industry will have an annual turnover of more than £1 billion ($1.6 billion) by 1995, with 3.5 million users annually spending £300 ($480) each for the service.

Abroad there has been something of a revival of CT2 telepoint. CT2 is being tested—or will be—in France, West Germany, Spain, Portugal, Finland and Italy. These countries, with the exception of Italy, signed memorandums of understanding with the U.K. and Belgium to adopt CAI CT2 telepoint in mid-March. Shortly thereafter, the ETSI formally adopted CAI CT2 as an interim European standard.

On the other side of the globe, New Zealand has decided to begin a telepoint trial, and Australia and Taiwan also are interested in telepoint. And Ferranti has had discussions with some of the Bell regional holding companies in the United States.

The DECT community does not share this benign view of CT2, fearing that the early introduction of CT2 will distort the overall cordless market.

The DECT position, as enunciated by Ericsson, is that time division multiple access DECT, operating in micro-cells of between 30 meters and 50 meters, is more suitable than frequency division multiple access CT2 for high-density PBX and business applications that generate the vast bulk of telephone traffic.

"We believe that the DECT standard will best combine the qualities that will be needed for the

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workplace," says Ericsson Chairman Bjorn Svedberg. "So we will put our money on DECT for the workplace."

The DECT standard is based on a proposal made

by Televerket, the Swedish PTT, and Ericsson in 1985 that was endorsed by the Conference of European Post and Telecommunications (CEPT) administrations in 1988. In Sweden, DECT frequencies have already been allocated and PBX applications will be tested this year.

The Dutch PTT also has decided to evaluate Ericsson pre-DECT systems in both PBX and telepoint applications. Dubbed CT3 by Ericsson, the pre-DECT technology will be tested in the U.S., Canada and Australia. In April Ericsson licensed CT3 manufacturing and distribution rights to Canada's NovAtel. It is the first in a number of new CT3 international partnerships, Ericsson says.

While DECT-like systems are beginning to target the public domain, CT2 is being developed for PBX applications. Championing this initiative is the U.K.'s GPT, which is believed to have 50-port and 100-port models near completion. There are also plans, more fully articulated in France than elsewhere, to overcome CT2's one-way calling limitation by manually registering a subscriber's presence in a given coverage zone.

The two cordless technologies are converging on the same business market sector from different starting points, with CT2 moving off the street into the office and DECT out of the office and into the street. Although CT2 will not achieve universal two-way calling without substantial advances in intelligent network technology, its more restricted repertoire will be offset by lower prices.

"It's a rat race in this sector," says Svedberg.

Interestingly, companies on both sides of the cordless divide are hedging their bets. GPT, for example, has a £1 million DECT development budget. Svedberg has indicated that, in time, Ericsson will probably supply non-DECT cordless equipment.

PCN Rising

As CT2 and DECT limber up to meet each other in the marketplace, PCN advocates are developing strategies to lure customers away from cellular services. An added dimension to the battle is that European subscribers will be able to choose either analog or digital systems for several years. And operators of the GSM system are not always the same as the existing analog cellular operators.

The PCN/cellular drama first will be played out in the U.K., where the two analog cellular operators, Cellnet and Vodafone, already have more than 1 million subscribers and are presently gearing up for GSM. Pitted against them are the three PCN operators looking for a late 1992 service launch and a total subscriber base of around 10 million by the end of the decade.

This month the three nominated PCN operators were still negotiating the terms and conditions of their licenses with the DoTI even though the general outline of their intentions is already known.

Initially the U.K. PCN license applicants were invited to submit proposals derived either from the 900-MHz GSM standard or DECT. And separate proposals for each could be made. Then the DoTI would nominate the operators and announce a common standard. But the DoTI simply announced the three licensees, leaving them to negotiate standards with the ETSI.

Observers believe that throwing the PCN standards ball into the ETSI's court was designed to avoid a repetition of the earlier CT2 run-in between the U.K. and the EC. "It was prudent to let them have a view on it," says Motorola Europe Corporate Vice President Don Burns.

As a result, the basic technology platform for PCN is a higher frequency version of GSM, now dubbed the Digital Cellular System at 1800 MHz (DSC 1800) by the ETSI review.

Instead of being oriented toward relatively high-powered vehicular terminals like current generation cellular systems, U.K. operators intend for PCN to use very low power pocket phones. This reduction in terminal size and power is possible because of the use of micro radio cells that are between 0.4 kilometers and 6 kilometers in radius in urban areas. Analog cellular uses cells that average 15 kilometers or more.

Using very small cells, specific service coverage areas can be tailored to meet individual needs compared to analog cellular, which has a blanket coverage and tariffing structure. Smart card technology will provide some of the intelligence to operate PCN systems, although Mercury Personal Communications is already committed to spending $16 million on information technology systems.

The first PCN pocket phone—weighing slightly more than a microcassette tape recorder—uses smart card technology and includes an internal antenna. It will be unveiled by Mercury Personal Communications in mid-June and will probably be manufactured in bulk by Motorola, a partner along with Cable & Wireless and Telefonica in the Mercury consortium.

Peter Carpenter, Mercury Personal Communications' director of finance and business strategy, predicts that PCN terminal unit prices will start at $800 and drop to around $320 by 1995.

"Terminal costs are a matter of volume," Carpenter says. "As with other consumer electronics, every time you double the volume, the price goes down 20% or 30%."

Mercury's service will initially target urban subscribers. "We're interested in covering the people, not the sheep," says Carpenter. "Wide-open cellular,

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the national service, covers a lot of sheep in the process."

PCNs also will initially build volume on the type of business subscriber now using cellular telephony. It would be erroneous, however, to conclude that PCN operators will undercut cellular subscription or terminal prices. Carpenter cites market research that indicates business users are prepared to pay at least current cellular prices for the smaller terminal size and added functionality of PCN.

As far as call charges are concerned, Mercury's local area rates will be slightly more than telepoint rates, but about 50% less than cellular service.

As might be anticipated, U.K. cellular operators are not resting on their laurels as PCN approaches.

The DECT community does not share this benign view of CT2, fearing that the early introduction of CT2 will distort the overall cordless market.

Both Cellnet and Vodafone are mulling schemes to include low-cost, urban micro cellular options in their service repertoires. Gerry Whent, chief executive officer (CEO) of Racal Telecom, Vodafone's biggest shareholder, is reported to be considering an investment of $160 million to launch a service using 1-kilometer cells. Cellnet already operates a cell with a 0.5-kilometer radius.

The cellular operators also are cleaning up their existing analog cellular offerings, which have been heavily criticized lately for low quality and high congestion. Vodafone is believed to be spending $224 million annually to expand its infrastructure, while Cellnet Managing Director Stafford Taylor relaunched service May 15 with an annual investment program of more than $320 million.

Cellnet wants to expand its voice channels in use from 11,500 in October 1989 to 30,000 by next March to help reduce its average ratio of customers to voice channels from the 35 recorded in November 1989 to 21 by March 1991.

Don't Forget GSM

Approximately 17 PTTs have committed to GSM, with countries such as the U.K. beginning service in mid-1991. According to EC estimates, there could be 16 million GSM subscribers by the end of the decade, although there are conflicting opinions about the rate of service uptake.

Roland Mahler, who oversees mobile developments at Deutsche Bundespost Telekom, believes that a second-generation GSM will "certainly be needed before 1995." By contrast, a recent report from U.K.-based CIT Research opines that GSM is "unlikely to achieve the success suggested by its proponents much before 1995."

The cross-border use of GSM was originally touted as one of its unique selling points. Today, the consensus is that this will be of less consequence than the additional capacity it will provide.

"Our position on the perceived demand for Pan-European roaming remains consistent with past convictions," says CIT Research. "We have encountered little to suggest that there will be much demand for an international roaming facility. Even if demand exists, the feature will not be available in all parts of Europe until full infrastructure coverage is achieved."

Although Orbitel unveiled a production-sized GSM handset in late April, progress toward comprehensive GSM standardization has not been easy. The ETSI, which has taken control of the process, has acknowledged slippage in the original schedules.

There also are residual problems with intellectual property rights. Some ETSI members have criticized Motorola and Philips for not allowing free access to their key GSM technology patents. As a result, there is a new initiative within ETSI to force companies to surrender patents or be expelled from the ETSI.

Continuing difficulties with GSM standardization could, of course, adversely affect PCN and delay the stabilization of the DCS 1800 specification by December.

Extended delays would undoubtedly hurt the U.K.'s PCN operators. Notwithstanding the participation of Telefonica and Deutsche Bundespost Telekom in two of the U.K. PCN consortia, and talk of a forthcoming regional memorandum of understanding on PCN, there have been few concrete proposals for the service in mainland Europe as yet.

Telefonica is interested in using PCN as a quick fix to Spain's chronic shortage of wireline connections. And late last year PTT Minister Dr. Christian Schwarz-Schilling said it was highly probable that one or two PCN licenses would be issued in West Germany if the appropriate frequencies could be found.

There definitely is widespread interest in PCN and its possible contribution to the development of the overall mobile sector.

"You'd better keep up with the technology or you're going to end up in the rocking chair," argues Microtel CEO James E. Blake.

The U.K.-based MZA Consultancy predicts that in 1995 there will be 22.4 million European mobile communications users and the market will be worth $23.6 billion. Beyond 1995, there is general consensus that total users and revenues generated in mobile communications will rival telephone statistics.

Some observers believe future overall regional demand will accommodate many different suppliers and products. As Arthur D. Little Senior Consultant Malcolm H. Rose points out, mobile operators and equipment suppliers are actually struggling to keep up with demand.

Other observers believe that demand will remain buoyant, but user numbers will not increase at present rates indefinitely. These observers think that particular features of some mobile technologies will make them more marketable than others. Certainly the public pronouncements of the CT2 telepoint, DECT, GSM and PCN lobbies indicate that fierce competition is inevitable. ■